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Publications marked (*) are not available for distribution

ALCOHOL FROM AGRICULTURAL COMMODITIES.

By P. Burke Jacobs. AIC-74-Slightly revised. July 1946.
Mimeographed.

A survey has been made of the production, utilization, and industrial aspects of ethyl alcohol, including studies of both industrial and beverage alcohol industries. Alcohol production from various sources, including synthesis, are enumerated along with production, costs, and other financial aspects. Improvements in technological processes are described (e.g., continuous cooking and fermentation, re-use of yeast, recovery of byproducts, manufacture of anhydrous alcohol). Use of alcohol for synthetic rubber and motor fuel is discussed in relation to the post-war situation of the alcohol industry.

REACTIONS OF CONJUGATED FAT ACIDS. I. ADDITION OF CROTONIC ACID DERIVATIVES.

By Howard M. Tester, Charles R. Scholfield, and John C. Cowan. Oil and Soap 23 (7): 216-219 (July 1946).
Ethyl crotonate and crotononitrile react with nickel-isomerized fat acid esters from soybean oil to give Diels-Alder type of adducts. The ester adducts form polyesters, and the adduct appears to be a good plasticizer for polyvinyl chloride.

PRELIMINARY STUDIES ON THE PRODUCTION OF α -KETOGLUTARIC ACID BY *PSEUDOMONAS FLUORESCENS*.

By Lewis B. Lockwood and Frank H. Stodola. J. Biol. Chem. 164 (1): 81-83 (July 1946).

α -Ketoglutaric acid has been obtained in 16 percent yield by the oxidative fermentation of glucose by Pseudomonas fluorescens.

A NEW ANHYDRIDE OF D-GLUCOSE: D-GLUCOSAN <1,4> β <1,6>.

By R. J. Dimler, H. A. Davis, and G. E. Hilbert. J. Am. Chem. Soc. 68 (7): 1377-1380 (July 1946).

The isolation and proof of structure of a new hexosan, D-glucosan <1,4> β <1,6>, found in the mixture of products obtained on vacuum pyrolysis of starch, are described. The properties of its triacetate, tri-p-toluenesulfonate, tri-p-nitrobenzoate, and trimethyl ether are given. This glucosan contains a trans-glycol group which is not oxidized by periodic acid or lead tetraacetate under conditions used for detection of adjacent hydroxyl groups.

SOYBEAN PROTEIN PRODUCTION--EFFECTS OF TEMPERATURE AND WATER-FLAKE RATIO.

By A. C. Beckel, P. A. Belter, and A. K. Smith. Ind. and Eng. Chem., Indus. Ed. 38 (7): 731-734 (July 1946).

A report is made on the study of the pilot plant production of soybean protein with emphasis on the effect of temperature and water-to-flake ratio. Water-to-flake ratio is particularly important economically with respect to relative price of soybean meal.

COMPOSITION OF HYBRID CORN TASSELS.

By J. M. Van Lanen, F. W. Tanner, Jr., and Shirley E. Pfeiffer. Cereal Chem. 23 (4): 428-432 (July 1946).

The composition of hybrid corn tassels at three stages of maturity has been determined. Tassels are good sources of protein and vitamins and attain highest nutrient value at the normal detasseling time. These tassels contained (moisture-free basis) protein 18.3, fat 6.9, ash 4.5, crude fiber 18.2, and nitrogen-free extract 52.1 percent. Vitamin content was γ per gram (moisture-free basis) riboflavin 8.8, niacin 60, pantothenic acid 25.9, pyridoxin 3.2, thiamin 10, and carotene 13. The tassels contained 8 times the riboflavin, 3 times the niacin, 3 times the pantothenic acid, 12 times the carotene, twice the thiamin, and half the pyridoxin potency of corn grain.

*PROCESSING OILSEEDS AND OILS IN GERMANY.

By W. H. Goss. Oil and Soap 23 (8): 241-244 (August 1946); The Cotton and Cotton Oil Press 47 (18): A-3, A-6, A-7, A-10 (September 1946).

Descriptions are given of the equipment used and the practices followed in the German oilseed and edible oil industries, based on observations made during an investigation shortly after the cessation of fighting in 1945.

PREPARATION OF DIHYDROFYRAN, 3-HYDROXYVALERALDEHYDE AND 1,5-PENTANEDIOL FROM TETRAHYDROFURFURYL ALCOHOL.

By L. E. Schniepp and H. H. Geller. J. Am. Chem. Soc. 68 (8): 1646-1648 (August 1946).

A three-step process for the preparation of 1,5-pentanediol in 70 percent yield from tetrahydrofurfuryl alcohol is described.

Tetrahydrofurfuryl alcohol is converted to dihydropyran in 90 percent yield over a preconditioned Al_2O_3 catalyst. The dihydropyran is hydrolyzed to 5-hydroxyvaleraldehyde by boiling with dilute HCl and the hydroxyaldehyde is catalytically reduced to the diol over a copper chromite catalyst.

SOME FACTORS AFFECTING THE PRODUCTION OF ITACONIC ACID BY *ASPERGILLUS TERREUS* IN AGITATED CULTURES.

By Lewis B. Lockwood and George E. N. Nelson. Arch. of Biochem. 10 (3): 365-374 (August 1946).

Nutrient conditions for the production of itaconic acid by *Aspergillus terreus* in still cultures are quite different from those suitable for its production in agitated cultures. The response to $MgSO_4 \cdot 7H_2O$ or $ZnSO_4$, found in still cultures, does not occur in agitated cultures, and addition of NaCl to agitated cultures results in lower itaconic acid yields. In agitated cultures, high yields of itaconic acid are obtained when very small inocula are used in glucose solutions of about 6 percent concentration.

SOLVENT EXTRACTION OF OILSEEDS.

By W. H. Goss. Oil Mill Gazetteer 51 (3): 29-37 (September 1946); Oil and Soap 23 (11): 348-354 (November 1946); 51 (7): 11-18 (January 1947); also multilithed, AIC-135.

The development of solvent extraction for processing oilseeds is described, including descriptions and illustrations of various batch and continuous systems and the methods of using them.

SOYBEAN RESEARCH AT THE NORTHERN REGIONAL RESEARCH LABORATORY, 1936-1946.

By G. E. Hilbert. The Soybean Digest 6 (11) (September 1946). The work of the U. S. Department of Agriculture on industrial utilization of soybeans for the ten-year period 1936-1946 is briefly summarized. Particular emphasis is placed on the more recent work now in progress at the Northern Regional Research Laboratory, including alcoholic extraction of soybeans, flavor stability of soybean oil, improved soybean oil paint, plywood adhesives, and lacquer-like material.

THE ROLE OF PLANT CELLULOSE AND LIGNOCELLULOSE IN THE DEVELOPMENT OF THE PLASTICS INDUSTRY.

By R. V. Williamson. Jour. N. Y. Botanical Garden 47 (561): 225-232 (September 1946).

Cotton in the form of cellulose nitrate was the basic ingredient in the first plastic-celluloid. In modern times cellulose is produced from various trees and plants, and other cellulose derivatives such as the acetate, butyrate, propionate, and ethyl cellulose are important compounds in the present day plastics industry. A milestone in the development of plastics occurred when wood flour was added to phenolformaldehyde resins to produce

stronger and cheaper molding compounds. More recently agricultural residue flours such as those made from corncobs, ricehulls, and wheat straw have been successfully used. Lignin, the material that binds the cellulose fibers together in trees and plants, has also found a place in the plastics industry.

GERMAN SOYBEAN INDUSTRY.

By W. H. Goss. The Soybean Digest 6 (11): 24-26 (September 1946). The methods used in Germany for processing soybeans and refining soybean oil are described.

COMPOSITION OF THE COMPONENT PARTS OF THE CORN KERNELS.

By F. R. Earle, J. J. Curtis, and J. E. Hubbard. Cereal Chem. 23 (5): 504-511 (September 1946).

Eleven samples of corn of known variety were separated by hand into endosperm, germ, bran, and tip cap. The whole grain and the fractions were analyzed for moisture, ash, nitrogen, oil, sugar, and starch. The samples included one flint, one flour, two white hybrid, and seven yellow dent hybrid corns. The selection of samples was made to include one sample of high oil content and one of low oil content for both the white and yellow hybrids.

The endosperm (about 82 percent of the grain) was found to contain about 15 percent of the ash and oil in the grain, about 30 percent of the sugar, 70 percent of the protein, and 98 percent of the starch. The germ (about 12 percent of the grain) contains about 80 percent of the ash, 85 percent of the oil, 25 percent of the protein, 70 percent of the sugar, and 1.5 percent of the starch. The bran and tip cap (about 6 percent of the grain) contain relatively small amounts of the constituents determined.

A CRITICAL EVALUATION OF THE NITROGEN ASSIMILATION TESTS COMMONLY USED IN THE CLASSIFICATION OF YEASTS.

By Lynferd J. Wickerham. Jour. Bact. 52 (3): 293-301 (September 1946). The ability of yeasts to assimilate ammonium sulphate, urea, asparagine, or peptone, from a synthetic medium has been widely used as diagnostic tests in classification. In the past, the medium contained only potassium dihydrogen phosphate, magnesium sulphate, glucose, and one of the nitrogen sources. By addition to this medium of eight pure B vitamins, trace elements, NaCl and CaCl_2 , all species that were studied which previously had been designated by various authors as not able to assimilate ammonium sulphate, urea, and asparagine were found to do so. When the vitamins were omitted, only one of these species was found capable of continued growth, thus demonstrating that it was the lack of vitamins in the previously used medium which prevented growth from occurring with some species, and not an inability to use the particular nitrogen source in the medium.

REFRACTIVE INDEX OF ETHANOL-WATER MIXTURES AND DENSITY AND REFRACTIVE INDEX OF ETHANOL-WATER-ETHYL ETHER MIXTURES.

By Troy A. Scott, Jr. J. Phys. Chem. 50 (5): 406-412 (September 1946).

Refractive indices at 25° C. of ethanol-water mixtures were determined and a table was prepared giving n_D^{25} for integral values of percent water. Densities at 25° C. and refractive indices at 25° C. were determined and tabulated on mixtures ranging in composition from 90 percent ethanol, 5 percent water, 5 percent ethyl ether to 100 percent ethanol.

THE DEVELOPMENT OF IMPROVED PENICILLIN-PRODUCING MOLDS.

By Kenneth D. Raper. Annals of The New York Academy of Sciences 48 (Art. 2): 41-56 (September 1946).

Early studies on penicillin production were based upon the use of the unimproved Fleming strain of Penicillium notatum. By selective recultivation, substrains producing greatly increased yields in surface cultures were obtained. These were not suitable for submerged production, however, and cultures of different origin were found which effected this type of production. Search for more productive strains from natural sources yielded a strain of Penicillium chrysogenum NRRL 1951, from which a much higher-yielding substrain was obtained by selective recultivation of naturally occurring variants. Further marked and progressive improvements resulted from X-ray irradiation of the conidia of such a natural variant, followed by ultraviolet irradiation of the conidia of the best X-ray induced mutation. The capacity to produce penicillin was thus increased from about 100 μ /ml. to 1,000 μ /ml.

CATALYTIC ISOMERIZATION OF VEGETABLE OILS. NICKEL CATALYSTS.

By S. B. Radlove, H. M. Teeter, W. H. Bond, J. C. Cowan, and J. P. Kass. Ind. and Eng. Chem., Indus. Ed. 38 (10): 997-1002 (October 1946).

A survey of active surface catalysts was made and the nickel-carbon black (from sulfite residues) catalyst was found to be the most active in producing conjugation. The catalytic reaction and the properties of the isomerized oils are discussed.

CATALYTIC ISOMERIZATION OF VEGETABLE OILS. EVALUATION OF OILS IN BODYING, VARNISHES AND ALKID RESINS.

By L. B. Falkenburg, A. W. Schwab, J. C. Cowan, and H. M. Teeter. Ind. and Eng. Chem., Indus. Ed. 38 (10): 1002-1009 (October 1946). Nickel-carbon conjugated soybean and linseed oils are compared with linseed and dehydrated castor oils as vehicles for the preparation of five different varnishes and for alkyd resins.

MICROMANIPULATIVE STUDIES ON GELATINIZED STARCH GRANULES.

By M. J. Cox and M. M. MacMasters. *Plant Physiology* 21 (4): 459-466 (October 1946).

A micromanipulative study was made of starches, including corn, glutinous corn, tapioca, and potato to determine whether length of paste might be correlated with ability of the individual granules to stretch without breaking. The data show that there is no apparent correlation between these two phenomena.

POLYMERIZATION OF DRYING OILS--RUBBERLIKE PRODUCT FROM VEGETABLE OILS; MOREPOL.

By J. C. Cowan, W. C. Ault, and H. M. Teeter. *Ind. and Eng. Chem., Indus. Ed.* 38 (11): 1138-1144 (November 1946).

A method of preparing improved rubber replacements from soybean oil is described. Fat acid esters are converted to polymeric fat acid esters and to the ethylene glycol polyester of polymeric fat acids. By suitable compounding and curing of the polyester, a rubber replacement is obtained.

A MODIFICATION OF HENRICI'S VEGETABLE-JUICE SPORULATION MEDIUM FOR YEASTS.

By Lynferd J. Wickerham, May H. Flickinger, and Kermit A. Burton. *J. Bact.* 52 (5): 611 (November 1946).

A culture medium favorable for the sporulation of many yeasts, including species of *Hansenula*, *Zygoheansenula*, *Pichia*, *Zygopichia*, *Saccharomyces*, *Zygosaccharomyces*, and *Debaryomyces*, is described. The medium is based upon a mixed vegetable juice preparation similar to that marketed in the United States as "V-8".

A NOTE ON MESO-ERYTHRITOL, A METABOLIC PRODUCT OF *ASPERGILLUS TERREUS*.

By Frank H. Stodola. *J. Biol. Chem.* 166 (1): 79 (November 1946). Meso-erythritol has been isolated in small yields from the culture liquor resulting from the growth of an ultraviolet-induced mutant of *Aspergillus terreus* on glucose solution.

THE OXIDATION OF PENTOSEs BY PSEUDOMONAS.

By Lewis B. Lockwood and George E. N. Nelson. *J. Bact.* 52 (5): 581-586 (November 1946).

In aerated cultures containing CaCO_3 , *Pseudomonas fragi*, *P. graveolens*, *P. synxantha*, and *P. vendrelli* oxidize d-arabinose to d-arabonic acid; *P. fluorescens*, *P. fragi*, *P. mildenbergii*, *P. putida*, *P. synxantha*, and *P. vendrelli* oxidize l-arabinose to l-arabonic acid; *P. fluorescens*, *P. fragi*, *P. graveolens*, *P. mildenbergii*, *P. ovalis*, and *P. putida* oxidize d-xylose to d-xylonic acid, and *P. fluorescens*, *P. fragi*, *P. graveolens*, *P. mildenbergii*, *P. ovalis*, *P. putrifaciens*, *P. synxantha*, and *P. vendrelli* oxidize d-ribose to d-ribonic acid.

PRECISE LOW-PRESSURE MEASUREMENTS WITH A THERMOCOUPLE GAGE.

By William G. Smiley. Ind. Eng. Chem. 18 (12): 800-801
(December 1946).

A commercial thermocouple vacuum gage, usually used only for rough measurements, has been adapted to give precise results. By (1) operating at constant temperature rather than constant current, (2) water-jacketing to eliminate room temperature fluctuations, and (3) using a potentiometer to measure current and e.m.f., pressure readings are reproducible within 0.1 percent from 0.02 to 2 mm. Hg. pressure and within 1 percent from 0.002 to 20 mm.

